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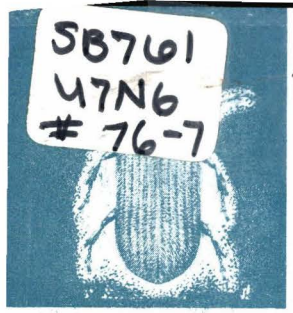

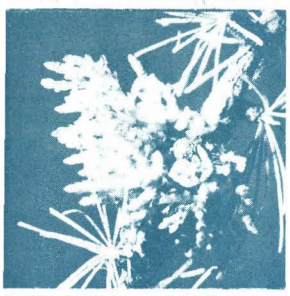

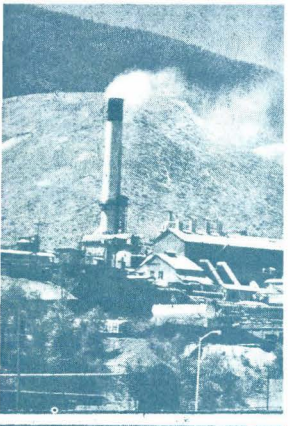

FOREST ENVIRONMENTAL PROTECTION

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BIOLOGICAL NOTES ON THE EMERGENCE OF MOUNTAIN PINE BEETLE AND ASSOCIATES FROM LODGEPOLE PINE, GALLATIN RANGER DISTRICT, GALLATIN NATIONAL FOREST, MONTANA, 1975

by

D. R. Hamel and M. D. McGregor

ABSTRACT

Emerged beetles were first collected July 17 and peak emergence occurred between August 10 and 26, 1975. Density of attacks averaged four per 0.5 ft.^{2} (0.05 m^2). Parent to brood ratio was 1:4.6. Thirteen associate insects, representing six families of Coleoptera and one of Diptera, were recovered. Associates included predators and secondary bark beetles. Future studies dependent on mountain pine beetle emergence require initiation or completion prior to mid-July.

INTRODUCTION

Management of mountain pine beetle (*Dendroctonus ponderosae* Hopk.) in lodgepole pine (*Pinus contorta* var *latifolia* Engelm.) often requires coordination of study activities with events in the beetle's life cycle. If management alternatives are ill-timed efficacy of the practices decreases. Thus, it is necessary to accurately know the timing of events in the beetle's life cycle. Events such as beetle emergence vary with weather and geographical locations within the Northern Region. It is important, therefore, that biological data from specific areas be applied to those areas rather than basing it on westwide averages.

Information on mountain pine beetle and its associates and their respective buildup ratios also assist in determining population vigor and potential for continued infestation.

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The objectives of this biological evaluation were to determine: (1) dates of mountain pine beetle emergence, (2) density of attacks, (3) parent to brood ratios, and (4) associates of the mountain pine beetle, on the Gallatin National Forest.

This report summarizes the evaluation and provides necessary biological information for several studies 1/ (4, 5, 8) on the forest.

METHODS

Study area.--Two side drainages of the Gallatin Canyon were selected for this biological evaluation. Hellroaring and Logger Creeks are adjacent drainages, 15 miles south of Bozeman, Montana, Gallatin District, Gallatin National Forest. Both sites are at an elevation of 6,200 feet (1,889.76 m). Habitat type is *Abies lasiocarpa/Linnea borealis*. Stands are mixed and composed of 84.7% lodgepole pine, 7.2% spruce, 7.6% Douglas-fir and 0.3% subalpine fir. Average stand age is 97.5 years. Both drainages are included in an area of current, epidemic mountain pine beetle infestation (7, 8).

Data collection.--Half square foot ($0.05m^2$) mesh cages, with glass vials attached, were used to recover emerged adults of *D. ponderosae* and associates. Prior to 1975 beetle emergence, 22 cages were attached to trees with a Bostitch staple gun along Hellroaring and Logger Creeks. Sample trees ranged from 7 to 19 inches (17 to 48 cm) d.b.h. (Table 1). Cages were checked at 7- to 14-day intervals. Emerged insects were preserved in 95% alcohol and transported to the laboratory for determination. Screen cages and the bark underneath were removed in November. Number of attacks per half square foot ($0.05m^2$) of bark surface and unemerged stages of *D. ponderosae* were recorded. Emergence data for both areas were combined for the year.

RESULTS AND DISCUSSION

Adult *D. ponderosae* were first recovered on July 19, 1975 (Table 1). Number of emerging beetles increased during July and early August (Figure 1). By August 10, more than 50% of the beetles had emerged (Figure 2). Peak emergence occurred between August 10 and 26, and by September 17 emergence was complete.

Mean number of emerged adults per 0.5 $ft.^2$ ($0.05m^2$) per tree was 27.9. Mean number of starts per 0.5 $ft.^2$ ($0.05m^2$) per tree was 4.0 providing a 1:4.6 parent to brood ratio. This compares with the four to nine attacks per square foot reported by previous investigators (1, 3, 6).

1/ Field test study plan: Mountain pine beetle population manipulation through attraction-prevention management strategies by W. E. Cole, M. D. McGregor, G. D. Amman, L. A. Rasmussen, and G. C. Trostle - 1976.

Table 1.--Mountain pine beetle emergence data, Gallatin District Gallatin National Forest, Montana 1975.

Location	Tree No.	D.b.h. in cm. (and inches)	No. starts/ 0.05m² [2]	No. emerging adults [1] 7/19	7/27	8/2	8/10	8/26	9/17 [2]	Total No. emerged adults	Parent-brood ratio [3]
Hellroaring Creek	1	27.9 (11)	6	1	1	8	1	0	1	12	1:1.0
	2	20.3 (8)	4	0	0	0	0	11	0	11	1:1.4
	3	25.4 (10)	3	0	0	0	0	9	7	16	1:2.7
	4	30.5 (12)	6	0	2	2	8	8	7	27	1:2.3
	5	27.9 (11)	4	1	0	0	0	0	0	1	1:0.1
	6	33.0 (13)	3	3	18	13	13	2	11	60	1:10.0
	7	48.3 (19)	4	0 [4]	–	–	–	–	–	–	–
	8	35.6 (14)	4	0	0	2	6	0	1	9	1:1.2
	9	43.2 (17)	3	1	1	2	28	28	3	63	1:10.5
	10	38.1 (15)	6	0	2	0	5	30	5	42	1:3.5
	11	27.9 (11)	4	1	0	1	9	1	3	15	1:1.9
	12	17.8 (7)	1	1	0	0	55	0	3	59	1:29.5
	13	30.5 (12)	4	2	4	5	17	1	4	33	1:4.2
Logger Creek	1	27.9 (11)	6	0	1	0	0	0	33	34	1:2.9
	2	25.4 (10)	3	1	13	18	4	17	1	54	1:9.0
	3	22.9 (9)	2	0	0	0	7	1	0	8	1:2.0
	4	25.4 (10)	4	0	0	1	4	3	1	9	1:1.2
	5	22.9 (9)	6	0	0	11	3	72	4	90	1:7.5
	6	20.3 (8)	7	0	3	0	11	0	0	14	1:1.0
	7	27.9 (11)	4	0	1	0	7	3	4	15	1:1.9
	8	35.6 (14)	3	0	2	1	4	3	0	10	1:1.7
	9	33.0 (13)	5	0	1	0	1	1	1	4	1:0.4
Total	21	647.7 (255)	92	11	49	64	183	190	89	586	
Mean		29.4 (12)	4	0.5	2.3	3.0	8.7	9.0	4.2	27.9	1:4.6

1/ Includes all adult beetles collected in vials.
2/ Includes adult beetles collected in vials and escaped beetles as indicated by holes in mesh, plus adults remaining in bark on November 3, 1975.
3/ Parents = No. starts x 2.
4/ Collection device damaged early in study by a bear.

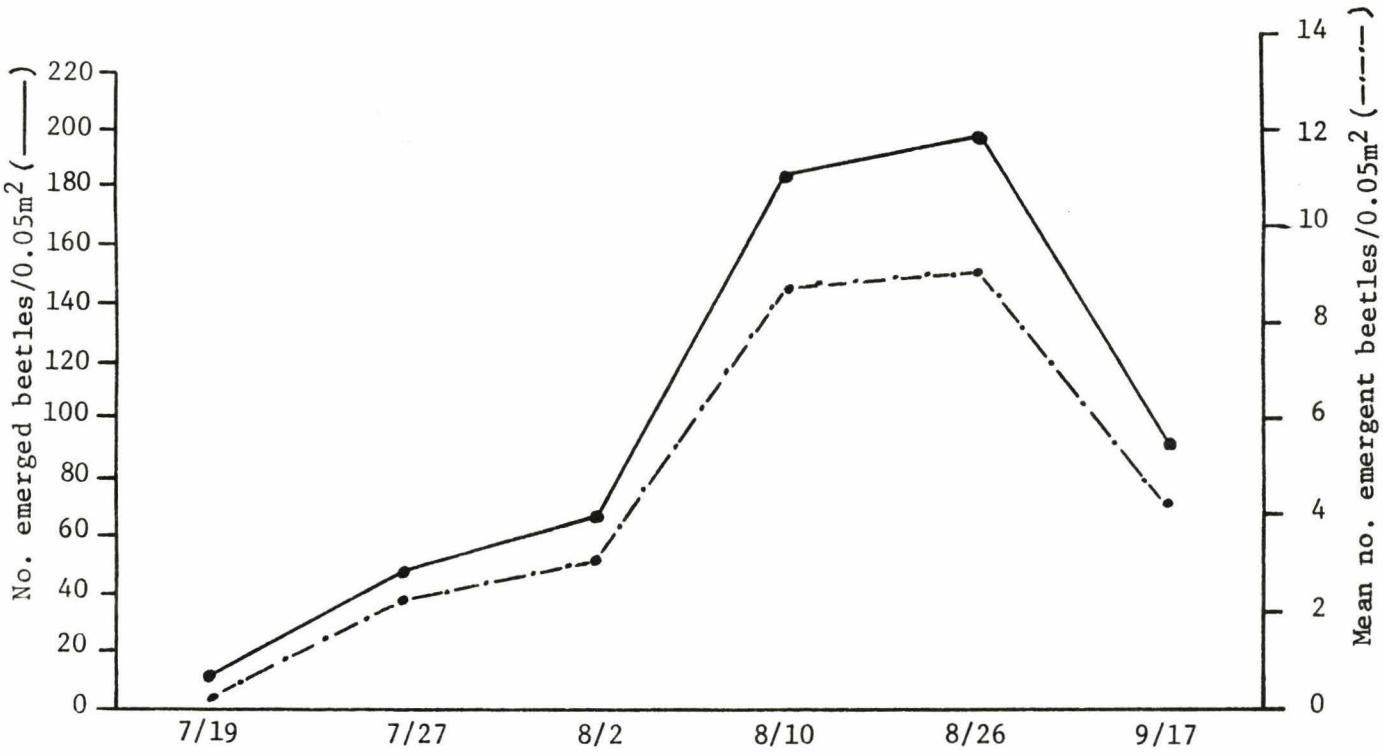

Figure 1.--Emergence of mountain pine beetle adults, Gallatin District, Gallatin National Forest, Montana, 1975.

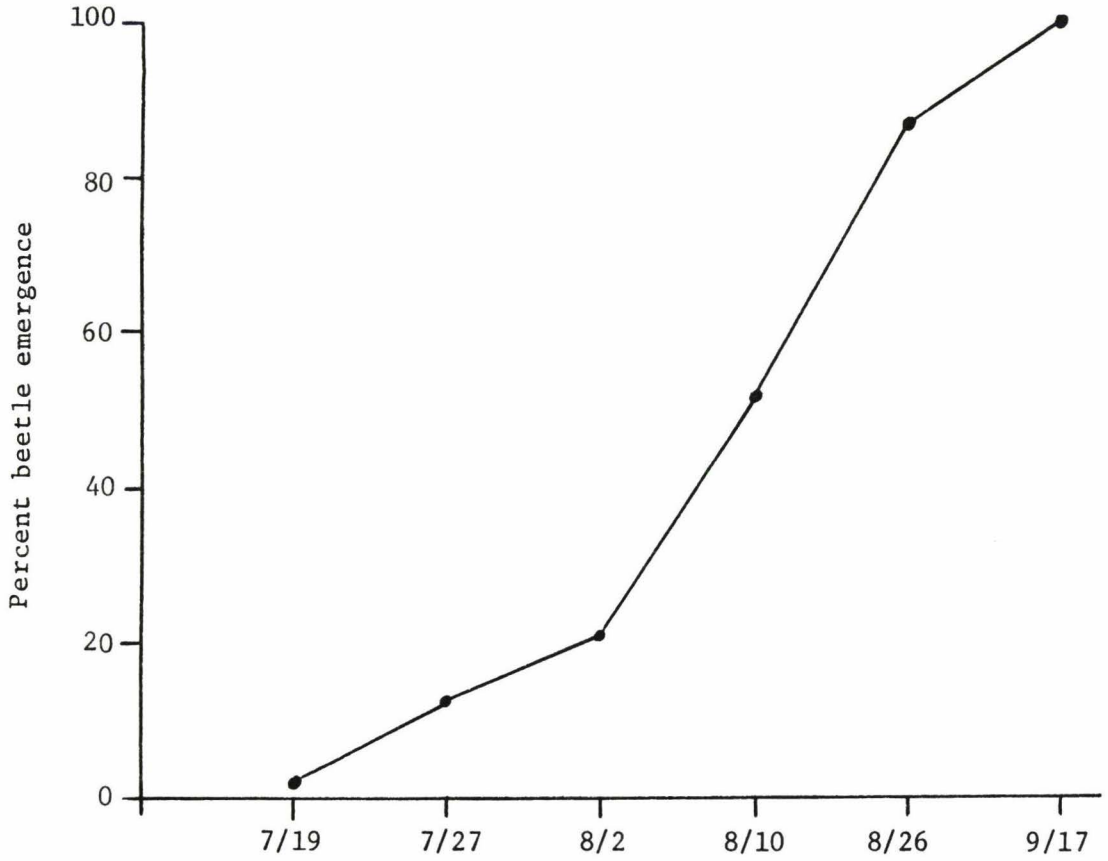

Figure 2.--Rate of mountain pine beetle emergence from lodgepole pine, Gallatin District, Gallatin National Forest, Montana, 1975.

Insects associated with *D. ponderosae* and collected during this study included six families of Coleoptera and one of Diptera (Table 2). Four species collected were determined to be predatory and two others were probable predators (2). The remaining associates were scolytid bark beetles frequently found associated with previously attacked or weakened trees or small diameter trees with thin phloem. Associates were categorized according to their relative abundance. "Rare" species were only occasionally recovered, "common" species were recovered in small numbers at both locations, and "abundant" species represented 5% or more of total beetle collection.

Table 2.--Associates of mountain pine beetle collected on Gallatin District, Gallatin National Forest, Montana, 1975.

Classification	Occurrence 1/	Association with mountain pine beetle 2/
COLEOPTERA:		
Histeridae		
Platysoma punctiger LeC.	Common	Predator
Cleridae		
Thanasimus undatulus Say	Common	Predator
Staphylinidae	Rare	Probable Predator
Colydiidae		
Lasconotus sp.	Rare	Predator
Tenebrionidae		
Corticeus sp.	Common	Probable Predator
Scolytidae		
Polygraphus rufipennis (Kby.)	Rare	Secondary bark beetle
Hylurgops lecontei Sw.	Rare	Secondary bark beetle
Pityophthorus sp.	Rare	Secondary bark beetle
Ips pini Say	Abundant	Primary/secondary bark beetle
Ips latidens (LeC.)	Abundant	Secondary bark beetle
Pityogenes knechteli Sw.	Rare	Primary/secondary bark beetle
Pityokteines sp.	Common	Secondary bark beetle
DIPTERA:		
Dolichopodidae		
Medetera aldrichii Wheeler	Common	Predator

1/ "Rare" species occasionally recovered; "common" species recovered in small numbers at both locations; "abundant" species representing 5% or more of total beetle recovery.

2/ Based on Chamberlain's (2) descriptions.

These data on emergence of adult mountain pine beetle and associates provide necessary biological information for continuing mountain pine beetle management evaluations on the Gallatin National Forest. Since earliest beetle emergence occurred during mid-July then studies dependent on emergence should be initiated or completed by this time. Future evaluation efforts in the Gallatin Canyon may continue to depend upon accurately verifying beetle emergence; therefore, emergence cages should be in place prior to mid-July.

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